

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (previously presented) A method for controlling a spark ignited engine operated with fuels of varying volatility or viscosity, comprising:
 - generating an acoustic wave in proximity to the fuel;
 - providing a signal related to viscosity or volatility of the fuel, said signal being derived from alterations in said acoustic wave caused by said fuel;
 - providing a base ignition timing signal to the engine for predetermined engine operation;
 - adjusting said base ignition timing signal in relation to said signal; and
 - adjusting a fuel injection amount in relation to said signal.
2. (original) The method recited in claim 1 wherein said generating further comprises at least one of propagating the wave into the fuel, or propagating the wave from a medium into the fuel.
3. (original) The method recited in claim 1 wherein said alterations in said wave include at least alterations in frequency, phase, amplitude, or propagation velocity.
4. (original) The method recited in claim 1 wherein said engine operation includes at least engine speed, engine load, throttle angle, or starting conditions.
- 5-6. (cancelled)

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7. (previously presented) A method for controlling a multi cylinder engine operated with fuels of varying volatility or viscosity, comprising:
- generating a signal related to fuel viscosity;
 - inducting air into each of the cylinders;
 - delivering fuel to each of the cylinders in relation to said inducted air and a desired air/fuel ratio;
 - generating a minimum air/fuel ratio in relation to said viscosity indication;
 - preventing said delivered fuel from falling below a minimum amount corresponding to said minimum air/fuel ratio; and
 - adjusting ignition timing in relation to said signal.
8. (original) The method recited in Claim 7 wherein said minimum air/fuel ratio is selected to reduce combustion instability.
9. (previously presented) A method for controlling a multi-cylinder engine operated with fuels of varying viscosity, comprising:
- generating an indication of fuel viscosity;
 - inducting air into each of the cylinders;
 - delivering fuel to each of the cylinders in relation to said inducted air to maintain an average desired air/fuel ratio;
 - adjusting said desired air/fuel ratio in relation to said fuel viscosity indication; and
 - adjusting ignition timing in relation to said signal.

10. (original) The method recited in claim 9 further comprising feedback controlling injected fuel based on an exhaust gas sensor.

11. (previously presented) A method for controlling a multi-cylinder engine operated with fuels of varying viscosity, comprising:

generating a signal related to fuel viscosity;

inducting air into each of the cylinders;

delivering fuel to each of the cylinders in relation to said inducted air to maintain an average desired air/fuel ratio;

adjusting said delivered fuel in relation to feedback from an exhaust gas sensor;

further adjusting said delivered fuel in relation to said signal; and

adjusting ignition timing in relation to said signal.

12. (previously presented) A method for controlling a multi-cylinder engine operated with fuels of varying viscosity, comprising:

generating an indication of fuel viscosity;

delivering fuel to each of the cylinders in relation to a desired output torque; and

adjusting said delivered fuel and ignition timing in relation to said fuel viscosity to maintain said desired output torque.

13. (previously presented) The method recited in Claim 12 wherein said desired output torque includes at least a desired engine torque, a desired torque from a vehicle operator, a desired torque from a controller, or a desired torque from a pedal position.

14. (previously presented) A method for controlling a multi-cylinder engine operated with fuels of varying viscosity or volatility, the engine inducting fuel vapors from a fuel system into an engine air intake, comprising:

generating an indication of fuel viscosity or volatility;

delivering injected fuel to each of the cylinders; and

adjusting said delivered injected fuel in relation to said inducted fuel vapors and said fuel viscosity or volatility indication.

15. (previously presented) The method of claim 14 wherein adjusting said delivered injected fuel in relation to said inducted vapors include adjusting said delivered injected fuel in relation to vapor flow and/or vapor density.

16-32. (cancelled)

33. (previously presented) A method for controlling a multi cylinder engine operated with fuels of varying volatility or viscosity, comprising:

providing a signal related to viscosity based on a rate of change of an exhaust system sensor; and

adjusting fuel injection and ignition timing in relation to said signal.

34. (cancelled)

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35. (currently amended) ~~The method of claim 5~~ A method for controlling a multi cylinder engine operated with fuels of carrying volatility or viscosity, comprising:
providing a signal related to viscosity or volatility of the fuel, said signal being derived from alterations in a source of energy directed into the fuel;
providing the fuel to at least one of the cylinders at a timing related to a predetermined engine operation;
adjusting said fuel timint to an earlier or later timing in relation to said signal; and
adjusting ignition timing in relation to said signal wherein said source of energy directed to the fuel is acoustic energy.